Attack on Blob: Mega Multiply

Renegadeware

V 1.0.0

# Table of Contents

(fill after)

# Game Overview

## Target Learning Objective

## [4.NBT.B.5 – Multiply Four by One and Two by Two Digit Numbers](https://drive.google.com/file/d/1f6soq0DJodacNKyBln6oD8dmowyJS9B8/view)

## Demographics

* Ages 8-11

## Genre, Theme, and Setting

* Arcade-Puzzle game with a scoring/grading system on how efficient and well (based on no. of mistakes) the player performs.
* Earth is in grave danger as space blobs have appeared (once more) in the night sky. Bigger and fatter than ever, these interstellar menaces have blotted the entire sky. Fast approaching, the player must banish them with the many secret techniques of multiplying large numbers.
* The game takes place in view of the starry night, with out of this world (literally) visuals to indicate the alien nature of the blobs (think the 70’s colorful-scheme and wavey-flow patterns).
* These blobs have a nonchalant look about them, sometimes with mirth, regardless of their own predicament.

## Core Gameplay

The game is broken down into two parts: lesson and blob banishment. Each lesson will introduce a concept on how to handle multiplying certain number of digits in the multiplication, and then followed by the blob banishment that puts those lessons into practice.

### Lesson

This is mostly non-interactive with explanation on how to deal with multiplying a certain number of digits on each factor. There will be a basic interactive tutorial on how to banish blobs, and using distributive principle (via area visual) to input the correct answer. Another basic interactive tutorial will be introduced later to deal with multiplying two by two-digit numbers.

Once all the lessons have been completed, the player can click on the “next” button to proceed to blob banishment. (Lesson archives could also be put here for player to review).

### Blob Banishment

During blob banishment, the player is tasked with creating a “cleansing” blob that will eradicate a pair of blobs, until all of them are banished. This is where the player makes use of distributive principle, to be able to compute the correct product of the connected blob factors.

## Look and Feel

* 70’s color-scheme and wavey-flow patterns as backdrops, along with a starry night sky during blob banishment.
* Soothing animated background during lessons, with a reassuring robot that explains the lesson.
* Non-menacing, happy-go-lucky blobs with a simple beady-eye, along with a line-mouth showing expressions depending on the situation: happy, nonchalant, worried, joy. Distinct look for large and small blob to distinguish who can pair with who.

Examples of these can be seen from a previous game – Attack on Blob: Multiply and Divide.

(show screens from Attack on Blob)

## Target Platform

* **WebGL with iPad support (iPad 6)** – The game will be completely mouse/touch driven, with the option to use the numpad/numbers from the keyboard when filling in the numbers.

# Game Flow

## Blob Banishment

### Summary

* 4 blobs are spawned in an enclosed circular board. Two large distinct blobs, and two smaller distinct blobs. Each blob displays a number inside them.
* The player connects a large blob to a small blob by dragging the mouse from one to the other. The player can only connect a large blob to a small blob (and vice versa). There will be a highlight on which blobs can be connected while dragging.
* Once two blobs are connected, the attack commences via a user interface with the following phases:

1. *Distributive* – visualizes the multiplication as the width and length of a rectangle, the player can click each digit in the 1’s, 10’s, etc. Once all the factors are distributed, the player can press “evaluate” to proceed.
2. *Evaluate* – The player will need to solve each area created during the distributive phase (via a numpad UI). Once all the values are put in correctly, the player will be able to press “summation” to proceed.
3. *Summation* – All values are aligned vertically, with slots at the bottom representing each digit. The player will need to compute each digit in order from right to left (via a numpad UI). Any carry-over numbers will visually be added at the top of the next column to the left. Once all digits are put in correctly, the player will be able to press “attack” to proceed.

* Once the player successfully completes the attack, a banish blob will appear on the board with the correct product value of the previously connected blob factors.
* The banish blob will automatically connect with the paired blobs, and all three of them will vanish.
* A combo counter will appear on the screen (or incremented if it appeared previously), the whole operation will be displayed at the top as a toast-notification, and the score is updated.
* Two more will appear, and the round counter is decremented. Repeat from connecting blobs until round counter is 0.
* Victory fanfare, and then a summary UI is shown with scores on each category of the player’s performance (detailed later), along with a grade. (Note: could also put a retry here if they got a low grade).
* Player clicks on the “next” button to proceed to the next lesson.

Part 1 – N (describe the lessons on each lesson part, describe what sort of factors are associated for each blob banishment part)

# LO Concept Coverage

## Academic Concepts

* Multiply a whole number of up to four digits by a one-digit whole number using strategies based on place value.
  + *This is done during the attack distribution phase where players must strategically split the digits up into separate additions from both factors. Along with the attack summation phase where all the distributed factors must be added together.*
* Multiply a whole number of up to four digits by a one-digit whole number using strategies based on the properties of operations.
  + *The game visualizes how factors are distributed when the player is splitting up a digit of a factor. Along with the rectangle area visualization, operations are shown throughout the attack phase.*
* Multiply two two-digit numbers using strategies based on place value and the properties of operations.
  + *This is presented at the latter half of the game.*
* Multiply a whole number of up to four digits by a one-digit whole number using strategies based on place value and the properties of operations.
  + *These are presented as the player progresses in the game, where larger numbers are presented.*
* Explain multiplication of a whole number up to four digits by a one-digit whole number and of two two-digit numbers by using equations, rectangular arrays, and/or area models.
  + *As demonstrated in the attack distribution phase, along with explanation in the lesson gameplay.*
* Represent multiplication using arrays.
  + *As demonstrated in the attack distribution phase.*

# Legends of Learning Required Content Practices

## Checklist Overview

|  |  |
| --- | --- |
| **ITEM** | **COVERED** |
| Players should learn and be held accountable through gameplay-based problem solving and experience. Players should not be learning primarily through text-based instruction or assessment items. |  |
| Game does not include multiple choice assessment items. |  |
| All instruction is scientifically and mathematically correct. |  |
| Confirm that the game is linked to 2/3 or 5 main concepts of the total, whichever is greater. Confirm that the linked main concepts are correctly covered in the game. |  |
| All on-screen words spelled correctly and grammatically correct. |  |
| Vocabulary and reading level appropriate for the lowest grade level within the target audience and grade band. |  |
| Game does not include material that is inappropriate for school. This includes, but is not limited to: violence, firearms, bombs, knives, daggers, blood, gore, smoking, vaping, drug use, any mind-altering substances, alcohol, harm to human-looking characters, harm to animals, insinuating killing or death, ideally they’re always chased away rather than eliminated. If there is conflict with an enemy in game, they are chased away rather than eliminated or killed. (There can be death if it is in the context of the learning objective – ex. The food chain) If you have any questions about this policy and your game, please ask us. |  |
| Game avoids any stereotypic presentation of gender, race, region, or culture. |  |
| Characters are diverse in gender, race, culture, and ability. |  |
| Players cannot simply click through and complete the game without learning. Players should be prompted to re-learn and re-do portions of the game where they had poor results due to less understanding of the academic material. Avoid the word “FAIL” if the student incorrectly understands academic material. |  |
| Academic problems are not consistently repeated. Players are presented with different problems to solve. |  |
| Gameplay mechanic reinforces the academic material, rather than being completely separate from instruction. I.e, there is a focus on academic reasoning rather than concept / question repetition. |  |
| Gameplay is intuitive and a player in the target age range can navigate the game and beat it with enough effort. |  |
| Games should be fun and interesting, designed as non-educational games are designed, with design to encourage players to keep playing. |  |
| Game is between 5 and 25 minutes in duration. |  |
| All text must be large, clear and concise with font sizes that can be read on a small Chromebook screen. |  |

## Connection Between Gameplay and Learning

* During the attack phase, the player is directly involved with distributing the factors. The visualization of the process will help the student understand the relationship of each digit of a factor, as well as how they are represented as products of the total area.
* Players are tasked to evaluate each area of the distributed factors, thus assessing their aptitude in multiplication.
* Players are also tasked to add all evaluated area to form the final product of the equation. They are tasked to evaluate each digit to assess how they understand carryovers when a summation of a digit is > 9.

## Role of Text in Learning

* A reassuring robot will be talking to the player to explain the various tricks of multiplying large numbers.
* Many of the explanation will be displayed in dynamic illustrations. Animations will help the player understand the properties of distribution, digits, and how they can be represented as an area.
* A step-by-step process will also help the player understand the game mechanics, as well as reinforce the lessons they just learned (guided by the robot).

## Characters – Diversity

* A reassuring robot talks throughout the game, it is gender neutral.
* All blobs are presented in a variety of sizes and colors, with a cheerful demeanor.

# Technical

## Development Hardware/Software

* All developers are using a PC with a Windows 10 OS.
* iPad 6 for tablet testing.
* Browsers: Firefox, Edge, Chrome, and Safari (via iPad 6)
* Game engine: Unity 2020.3.44+

## Asset Summary

* There will be some borrowed assets from the previous project: Attack on Blob: Multiply and Divide.
* Some logic from Attack on Blob: Multiply and Divide will be reused as well, but with the big addition of a new attack phase for the purpose of this subject’s LOs.
* Blobs will have the benefit of upgraded art to accommodate for various sizes.
* Game will be delivered via WebGL (targeting desktops and touchpads).

## Music and Sounds

* Will most likely use some music from Kevin Macleod, all under the [Creative Commons Attribution license](https://creativecommons.org/).
* We have a growing library of sound effects that are comprised of public licenses, as well as purchased licenses.

# Art Style

## Mockups

(show some made up stuff)

# Schedule for Development + Delivery

* 10 weeks accommodation
* Projected coding time
* Projected art asset time
* Projected lesson implements time
* Projected polish time (intro, ending, etc.)

# Story/Narrative

## Back Story

* Sequel to Attack on Blob: Multiply and Divide
* After some time, the collective blobs, that are banished into another dimension, started fusing together to form larger number values. This has caused an instability to the seal that prevents them from spilling over to our dimension.
* This rupture of the seal, and spilling of bigger blobs will be shown in the intro of the game.

## Plot Elements

* The use of the banish blob is a new solution to the problem presented. Whereas in the previous game, they were all banished together into another dimension. This time around, each blob is banished by these mysterious blob beings that appeared…by thoughts of mathematics across the world (at least the mathematically inclined ones).